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# Maximizing CADD

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# Maximizing CADD

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## Note:

This condensed version of CADD PRIMER is intended to give you an overview of CADD. It includes only important topics from CADD PRIMER. It does not include any diagrams. CADD PRIMER includes more than 100 diagrams that illustrate the working of CADD. For complete understanding of CADD refer to CADD PRIMER. This complete book is available for download for \$9.95 at <http://www.caddprimer.com> or you can order printed copies through the publisher listed at the end of this chapter.

## About this Chapter

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*So far, we have concentrated on CADD's drawing capabilities. But CADD is able to do much more than just drawing. It can help you design, perform analyses, and accomplish many automated tasks. There are a number of applications for CADD in architectural design, engineering calculations, product design, etc.*

*This chapter contains two main topics:*

- *Streamlining CADD Drawing Environment*
- *The Design Applications of CADD*

*Streamlining CADD Drawing Environment describes how to maximize CADD's drawing efficiency using symbol libraries, macros and customizing features. It also describes how CADD can be used to prepare project reports and cost estimates using database functions.*

*The Design Application of CADD describes how CADD can help you in design work. It outlines some categories of artificial intelligence programs associated with CADD and describes the concepts behind them.*

*Note: The objective of this topic is to give an overview of research and development taking place in the field of CADD. Although, artificial intelligence is out of the scope of this book, it introduces you to some of techniques and terms used in the artificial intelligence CAD industry.*

## Key Terms in this Chapter

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Term	Description
Artificial intelligence (AI)	A computer capability that enables the computer to think and make decisions.
Attribute	A description of a drawing object that is directly linked with the drawing.
CAFM	An acronym for Computer Aided Facility Management.
Database	A collection of data that can be extracted in several formats.
Design automation	A term associated with making the design procedures automatic.
Download	A procedure for transferring electronic files from a web site to a remote computer.
Drawing automation	A term associated with making the drawing process automatic.
DWF	
FEM	An acronym for Finite Element Method. It is programming technique commonly used for structural design programs.
FTP	An acronym for File Transfer Protocol. It is a procedure used to upload and download files on the Internet.
Fuzzy-logic	A programming technique used in artificial intelligence programs that can draw conclusions even if the statements are not completely true or false.
Integrated system	A group of programs that can work together as one package.
Intelligent CAD	A computer program with artificial intelligence and CADD capabilities.
Knowledge-based system	A category of artificial intelligence programs that makes use of information gathered from previous projects.
Lisp	A programming language used in AutoCAD.
Macro	A set of commands recorded in a file and played back to perform a task.
Parametric modeling	A capability of CADD that links calculations with the geometry of diagrams.
Spreadsheet	An electronic chart that contains information in rows and columns.
SVF	
Upload	A procedure for transferring electronic files to a web site from a remote computer.

## Streamlining CADD Drawing Environment

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When you start working with a new CADD program, it can be very slow to work with in the beginning. You can get efficient with CADD only when you use shortcut methods and special editing techniques, develop symbol libraries and implement prototype drawing standards.

*The following are some of the essentials for maximizing CADD:*

- Developing CADD symbol libraries
- Using macros
- Add-on CADD software

- Customizing CADD
- Using CADD database

## **Developing CADD Symbol Libraries**

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There are many symbols used in drawings that you may need to draw again and again. You don't need to draw these symbols every time you need them. You can draw them once and store them in special directories. These directories act as symbol libraries that can be readily accessed whenever you need a symbol.

Refer to CADD PRIMER for details on this topic.

## **Using Macros**

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A macro is a set of instructions recorded in a file that can be played back to perform a task. A sequence of instructions can be stored as a macro, which can be run at any time. As a result, using a macro can reduce a complex and lengthy process down to a single click of a mouse button or key.

Refer to CADD PRIMER for details on this topic.

## **CADD Drawing Automation**

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It is the dream of a CADD user to have CADD do as much work as possible. Can CADD be used to draw elevations from plans? Can it dimension the drawing automatically? Can it draw a 3D view from plans and elevations? With the help of advanced programming, it is possible to accomplish all of these tasks.

Refer to CADD PRIMER for details on this topic.

## **Customizing CADD**

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Customizing CADD plays a major role in achieving drawing efficiency. Most CADD programs allow you to customize them.

Refer to CADD PRIMER for details on this topic.

## **Using CADD Database**

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CADD allows you to develop a database that is linked with the diagrams in the drawing. You can add descriptions of drawing objects (attributes) in the database and link them to diagrams. The attributes can be used to describe many characteristics of diagrams, such as size, color, area and price. If you draw a symbol of a chair, it is just lines and arcs in computer memory; the computer does not know what it is. With the help of special CADD functions, you can describe all the attributes associated with it.

Refer to CADD PRIMER for details on this topic.

## **The Design Applications of CADD**

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Although CAD is an acronym for computer-aided design and CADD for computer-aided design and drafting most programs do not offer any design capabilities. They are just drafting programs, but manufacturers call them CAD or CADD anyway. You may be able to work out designs using the drafting capabilities of CADD, but that is not real computer-aided design. A CADD program can be truly called a design program only when it has the ability to solve problems and perform analyses.

Design is a vast subject and has different applications for different professionals. It has a specific meaning to an architect, a structural engineer, a civil engineer or a mechanical engineer. An architect may use CADD to design a building part, a structural engineer may use it for a design calculation and a civil engineer may use it for certain site design analysis.

The design applications of CADD are still a subject of research. Many academic institutes offer postgraduate courses dedicated to research and development of CADD design software. Some design programs have been developed for engineering applications, but generally they need to be customized.

Design programs are based on a number of principles and vary significantly in their approach. Some are mainly based on calculations, some involve comparison and logic in the program, while others involve the use of a database or another form of artificial intelligence. The following are some examples of design programs:

- Calculation programs
- Intelligent CAD
- Knowledge-based CAD systems

### **Calculation Programs**

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Calculation programs are extremely effective in solving complex mathematical problems. Specialized engineering CADD programs are designed to compute scientific, trigonometric, logarithmic and exponential functions. They can be used to perform many inter-connected calculations. If one variable in the calculation is changed, the program automatically adjusts the rest of the calculations. For example, a structural engineer working with frame structures does not have to calculate all the members each time a new span or load is added to the structure. The computer program understands that everything else is constant except the load and the span and can give the end results within seconds.

Refer to CADD PRIMER for details on this topic.

## **Intelligent CAD**

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Intelligent CAD programs are based on logic and comparison, and have a number of applications in product design, mechanical design, space planning, etc. These programs are not based purely on mathematics as the calculation programs. Besides mathematics, they analyze forms, shapes, arrangement of objects, patterns, colors, etc. They can draw conclusions even if the resulting statements are not completely true or false (a technique known as Fuzzy-logic).

Refer to CADD PRIMER for details on this topic.

## **Knowledge-based CAD Systems**

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Knowledge-based CAD systems (also known as expert systems), make use of information gathered from previous projects (or parameters defined by the programmer) and use it for new design proposals. The knowledge-based systems enable large corporations to constantly improve their design and manufacturing process. Let's say an engineering firm specializes in automobile design. They may have designed dozens of automobiles and have encountered hundreds of design problems associated with them. To design a new automobile, they don't need to address all the issues again. They can use the information gathered in the knowledge-based system to find quick solutions.

Refer to CADD PRIMER for details on this topic.

## **Integrated Systems**

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Integrated systems are a group of systems and software that can work in a network environment and share information. This approach is commonly adopted in large corporations that need hundreds of computers networked. The integrated systems are designed to include different application programs in one package. The programs are able to work as independent programs as well as share information.

Refer to CADD PRIMER for details on this topic.

## **Collaborating CADD Projects on the Internet**

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Internet is changing the way professionals collaborate CADD projects. Professionals can work as team and share CADD drawings with others thousands of miles away. The drawings can be sent using the E-mail and are delivered within minutes. Another method of distributing drawings is FTP. Using the FTP method, you can upload the CADD drawing files to specific server or web site. Any one with access to that server or web site can download the drawings. The E-mail and FTP methods are ideal for distributing drawings, however they do not provide real-time interaction between the team members. There are a number of project collaboration software available that allow you to instantly publish and share your drawings on the web.

Refer to CADD PRIMER for details on this topic.

## **CADD Artificial Intelligence (AI) Resources**

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This topic lists research and development resources associated with the CADD artificial intelligence industry. Refer to CADD PRIMER for details.

### **Important Tip:**

CADD programs are constantly being updated. There are new features added every time a new release comes out. However, the future of the CADD industry lies in the drawing automation and artificial intelligence programs. The advancement in this field has just begun. There are only a few such programs currently available; it is a wide-open field for anyone to explore. We will certainly see more advancement in this field over the next decade.

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### **CADD PRIMER ordering information:**

CADD PRIMER is available at 30% off the cover price when you order directly from the publisher at the address listed below or through the web site <http://www.caddprimer.com/discount30.htm>.

**MailMax Publishing, 43-15 Judge St., Suite 1R, Elmhurst, New York 11373.**

Voice mail: (212) 894-3748 Ext. 1039, E-mail: [info@caddprimer.com](mailto:info@caddprimer.com)

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